mortality, frequently exposed to fatal pestilences, and produced a com-
paratively large number of infants, of whom but a very small minority
lived to the age of puberty.   With the advance of civilization, and
the rise of prosperity, marriages became less fruitful, the mortality
decreased, the duration of life was considerably augmented, and the
population not only increased in numbers, but could boast of a much
larger proportion of men in the prime of life.   At the present day, the
fecundity is at its minimum, longevity is considerable, the small num-
ber of births and deaths is, perhaps, not equalled in proportion by any
town population, marriage is contracted at a more advanced period of
life, the population is nearly stationary, and is increased only by
immigration and the prolonged duration of life.

In closing this abstract it is but justice to M. Mallet to observe
that his memoir can only be properly appreciated by a careful perusal
of the original.   Many useful suggestions and much valuable assist-
ance will doubtless be derived by subsequent writers from the labours
of M. Mallet on the important subject of vital statistics.

Sanitary Statistics of the Metropolis.   By R. Thompson Jopling.

[Read before the Statistical Society of London, 14th April, 1851.]

At the present period, when the sanitary condition of towns is justly
engaging so much public attention, a few observations bearing on vital
statistics may not be without interest.

Till within a very recent period, this subject has been almost
wholly neglected; and whilst every branch of scientific investigation
has been steadily on the increase, this alone appears to have been
passed over as apparently unworthy of attention. Society, with strange
apathy, seems to have forgotten how much the durability of life
depends on the physical agents which surround it, and to have paid
little or no attention to what, with all, must be a primary consider-
ation—health and longevity.

Until the establishment of a uniform system of registration, statists
were denied the means of arriving at anything like a correct estimate
of the probabilities of life; and, whilst the means at present in use
must necessarily be defective, owing to the difficulty of procuring
correct returns, yet we may hope, at no great distance of time, with
the present rapid increase of knowledge, to be able to overcome
obstacles which now appear insurmountable, and to arrive at more
satisfactory and correct data.

To the philosopher, the merchant, and artizan, this subject is of
great importance, and embraces in its bearing objects of much interest.
Health, and its relation to longevity, must arrest the attention of all
who hope to reach the allotted period of life—three-score years and
ten.   Daily experience demonstrates how much lies within the reach
of man to add to his physical powers, and even to prolong existence;
and though we cannot hope, through the adoption of sanitary mea-
sures, to banish from our cities and towns the usual attendant of
civilized societies—disease, yet we may reasonably expect, by means
of well-devised hygienic regulations, to deprive it of much of its

malignancy, and to mitigate in a great measure those fearful epidemics which are at once the scourge and terror of us all.

When we look at the dense population of London and other chief towns of England, and see their busy crowds engaged in the tumultuous occupations of life, careworn in face, and prematurely old in body, the reflective mind naturally inquires, what are the causes which produce such a state of things, and what their action on the health of society? The answer may be found in the weekly bills of mortality, which show the premature deaths, and the paucity of those who reach forty years of age. Absorbed in the anxious cares of subsistence, the great bulk of mankind become indifferent to every other pursuit, and, so long as health remains, care little for anything beyond. To this cause we must ascribe the general indifference exhibited, not only to sanitary measures, but also to the principle of life-assurance, the necessity for which, though universally admitted, is individually not felt; the old adage constantly supplying its place,

         "All men count all men mortal but themselves."

The first subject to which I shall direct attention is that of population. Taking the years from 1831 to 1841 as a basis for calculation, it is purposed finding the number of persons inhabiting London in 1850, and every succeeding 10 years, for the space of a century, *i. e.*, till the year 1950. Thus—

     If $a =$ the population at the time of the census in 1831,

         $b =$ the same in 1841,

         $c =$ the period elapsed since 1841,

   and $d = 1 +$ annual rate of increase,

$$\text{Then} \quad \left(\frac{b}{a} \right)^{\frac{1}{10 \cdot 0219}} = d$$

$$\text{and} \quad \frac{\log. \, b - \log. \, a}{10 \cdot 0219} = \log. \, d$$

$$\therefore \log. \, b + (\log. \, d \times c) = \log. \text{ of the population at the period required.}$$

By this method the following table was formed:—

TABLE I.

Year.	Population.	Rate of Increase.
1850........	2,230,910	
1860........	2,602,101	
1870........	3,035,051	
1880........	3,540,039	
1890........	4,129,049	
1900........	4,816,062	·01515
1910........	5,617,384	
1920........	6,552,033	
1930........	7,642,095	
1940........	8,913,742	
1950........	10,396,857	

From the above table, it appears that the population of London in 1900 will be 4,816,062, supposing the ratio of increase to continue the same as at present, namely, 1·515 per cent. annually. At the com-

pletion of the century, in 1950, the inhabitants of the metropolis will have reached the enormous amount of 10,396,857.

On referring to the first and second weekly reports of the Registrar-General for the year 1850, I find that the number of persons in London to an acre, in 1849, was 30; of the number to each inhabited house at the same period, 7·4, *i. e.*, in every ten houses there were 74 persons; and in the third weekly report, that the metropolis covered a space of 73,715 acres, or about 115 square miles, including Hampstead, Wandsworth, and Lewisham.

The following table shows the space and number of houses required for the inhabitants of London during every decennial period from 1850 to 1950 inclusive, assuming that 30 persons live on an acre, and 7·4 in a house :—

TABLE II.

Year.	Acres.	Houses.	Year.	Acres.	Houses.
1850....	74,364	301,474	1910....	187,246	759,106
1860....	86,737	351,735	1920....	218,401	885,409
1870....	101,168	401,142	1930....	253.740	1,032,729
1880....	118,001	478,384	1940....	297.125	1,204,559
1890....	137,635	557,979	1950....	346,562	1,404,981
1900....	160,535	650,819			

In the above estimate of 30 persons to an acre are included several parts of London at present but thinly populated, such as Wandsworth, Hampstead, and Lewisham, which accounts for the small number of persons apparently distributed over the above-mentioned space.

According to the returns of the several water-companies, 155¼ gallons of water are daily supplied to each inhabited house in London. In Table II. it is computed that a house is inhabited by 7·4 persons, so that the average quantity of water supplied to an individual is 21 gallons, inclusive of the amount used for buildings, street-waterings, and domestic purposes. Table III. has therefore been formed on the assumption that 21 gallons per diem is the average quantity required :—

TABLE III.

Year.	Gallons of Water Daily.	Year.	Gallons of Water Daily.
1850........	46,849,110	1910........	117,965,064
1860........	54,644,121	1920........	137,592,693
1870........	63,736,071	1930........	160,486,095
1880........	74,340,819	1940........	187,188,582
1890........	86,710,029	1950........	218,333,997
1900........	101,137,302		

From this table it appears that, in 1850, the quantity of water that ought to have been supplied to the metropolis was 46,849,110 gallons, allowing 21 as the average for each person. In 1900, London will require 101,137,302 gallons; and in 1950, the amount requisite will be 218,333,997 gallons, *a quantity the present means in use would be wholly incapable of supplying.*

Leaving the quality for future consideration, I purpose showing the amount of sewage hourly infiltrating the Thames; and as this is

the source to which we must ultimately look for the chief supply of water to meet increasing demands, it is obvious to all how important a subject is the question of its purification, as bearing not only on health, but also on national wealth. Regarding the Thames at present as little better than a common sewer, it is now calculated the amount of excrementitious substances that are daily poured into it.

Modern physiologists estimate the quantity of solid matter yielded by an individual in the course of 24 hours, at about 5 ounces, and the average amount of liquid at 2 pints. In the following table, the calculation is based on the assumption that 2 pints is the quantity contributed by each person to the sewers of London* :—

TABLE IV.

Year.	Gallons of Sewage Daily.	Year.	Gallons of Sewage Daily.
1850........	557,728	1910........	1,404,346
1860........	650,525	1920........	1,638,009
1870........	758,763	1930........	1,910,549
1880........	885,010	1940........	2,228,436
1890........	1,032,263	1950........	2,599,215
1900........	1,024,016		

From this it appears that, in 1850, the number of gallons of sewage which passed into the river was 557,728. During 1900, there will be 1,024,016, and in 1950, it will have increased to 2,599,215 gallons. In the above estimate, it must be borne in mind that at present many houses in the metropolis are not sewered at all; but the loss derivable from this source is more than compensated for by the surplus residua of manufactories, slaughter-houses, &c.

Much surprise has often been expressed at the indifference shown by a great commercial and agricultural country to the evident loss of wealth arising from the waste of so much valuable manure. In 1828, attention was first directed to this subject by Mr. John Martin, who, in a pamphlet bearing on the question of the purification of the river Thames, first pointed out the loss the nation yearly experienced through neglect of so evident a source of wealth. He was subsequently followed in the same path by Liebig, whose chemical investigations still further contributed to arouse public attention to the subject. Had it not been for the labours of the above gentlemen, the subject might still have remained in abeyance, and the farmer left in the continuance of no better prospect than that derived from his present inferior manures, when he might be supplied with a better article at one-fourth the present price. In 1827, the importation of bones alone, for agricultural purposes, amounted to 40,000 tons, and Mr. Huskisson estimated their cost to be from 100,000*l.* to 200,000*l.* sterling; and this is but a tithe of what the outlay for guano has been, the fertilizing properties of which are not superior to the sewage of London.

But the most important question connected with this subject is the effect produced on the health of towns, through the want of a comprehensive and well-devised system of sanitary measures; experience demonstrating how much a healthy condition of cities depends on

* Older authorities estimate this at about 4 pints.

efficient drainage, open and airy streets, and a plentiful supply of water. As population advances, excrementitious substances must of necessity increase; and if more than a balance between cause and effect, *i. e.*, between health and one of the chief exciting causes of disease, is to be maintained, hygienic measures must increase also, and *corporate* and *private* interests succumb before comprehensive and active measures for the general good.

With a view to show the difference in mortality between London as a town, and England and Wales collectively, I have prepared Table V. in which is given the annual number of deaths to 100,000 persons* (50,000 males and 50,000 females); also the number out of which one will die in each year, including the difference per cent. between the metropolis and England and Wales, distinguishing ages, in order that it may be seen at what period of life the rate of mortality is most unfavourable in London, together with the difference per cent. in the mortality for males only.

In the three last columns of the following table, those figures having the sign plus (+) before them indicate the excess of mortality in London over that of England and Wales, and those having the symbol minus (−) the decrease :—

TABLE V.

Ages.	Males and Females.						Males only.
	England and Wales.		London.		Differ-ence of Mor-tality.	Differ-ence per Cent.	Differ-ence per Cent.
	Number of Deaths to 100,000 Living.	Number out of which one will die in each Year.	Number of Deaths to 100,000 Living.	Number out of which one will die in each Year.			
0 and under 1	17,975	6	20,662	5	+ 2,687	+ 14·95	+ 14·19
1 ,, 2	6,549	15	10,280	10	+ 3,731	+ 56·97	+ 59·47
2 ,, 3	3,511	28	5,247	19	+ 1,736	+ 49·44	+ 50·98
3 ,, 4	2,500	40	3,825	26	+ 1,325	+ 53·00	+ 55·24
4 ,, 5	1,842	54	2,701	37	+ 859	+ 46·63	+ 46·63
0 ,, 5	6,555	15	8,668	12	+ 2,113	+ 32·23	+ 31·63
5 ,, 10	913	110	1,190	84	+ 277	+ 30·34	+ 33·59
10 ,, 15	526	190	474	211	− 52	− 9·89	− 4·37
15 ,, 25	819	122	689	145	− 130	− 15·87	− 5·71
25 ,, 35	989	101	994	101	+ 5	+ ·50	+ 10·54
35 ,, 45	1,245	80	1,582	63	+ 337	+ 29·43	+ 43·15
45 ,, 55	1,662	60	2,363	43	+ 701	+ 42·18	+ 53·49
55 ,, 65	2,962	34	4,309	23	+ 1,347	+ 45·48	+ 53·20
65 ,, 75	6,249	16	8,506	12	+ 2,257	+ 36·12	+ 38·89
75 ,, 85	13,797	7	17,321	6	+ 3,524	+ 25·54	+ 28·33
85 ,, 95	28,599	2	31,160	3	+ 2,561	+ 8·95	+ 7·92
95 and upwards	41,746	2	38,649	3	− 3,097	− 5·89	− 12·63
All ages	2,186	46	2,522	40	+ 335	+ 15·32	+ 20·57

This table exhibits some very interesting facts. It will be perceived that, for all ages, the mortality of the metropolis is upwards of

* Calculated from the deaths in the seven years 1838 to 1845, from the Annual Reports of the Registrar-General.

15 per cent. (15·32) greater than that of England and Wales, males being about 21 per cent. (20·57). It also appears that the period of life most fatal in London is the first five years of existence. In the first year, the excess of mortality in the metropolis is 15 per cent. for both sexes; in the second, it rises to the enormous amount of 57; for males only, 59, or about three-fifths more than for England and Wales; during the second and third years, the conjoint mortality is not much less, being 49 per cent., or an increase of nearly a half more; in the third and fourth years, it is still higher, being 53; and between four and five years, it diminishes to 47 per cent.

In comparing the different rates of mortality shown in the above table, the question naturally presents itself to the mind, to what cause must be ascribed the great number of deaths during the first period of life, *i. e.* from 1 to 5 years of age? A variety of circumstances appear to contribute to this effect, viz., the general impurity of the atmosphere, the quantity and quality of food and clothing, dentition, and the various diseases incidental to infancy.

Among these dentition holds a very prominent place; for though the proportion of deaths arising from this cause falls far short of those occurring from diarrhœa, hooping-cough, measles, and scarlatina; yet we cannot but be struck with the mortality as being greater than ought to exist from a natural process, the others being epidemics, and, consequently, less amenable to control.

During the succeeding quinquennial period, viz., from 5 to 10, the mortality in London, though greater than England and Wales, is considerably less than the four preceding years, being 30 per cent. for both sexes, and 34 for males only—the increase being nearly one-third more for the metropolis. In the following five years, from 10 to 15, a remarkable change takes place, the respective ratios being reversed, London exhibiting 10 per cent. less than England and Wales. During the succeeding ten years the same feature presents itself, but a wider difference is observed between the conjoint mortality and that of males only, the former being 16 per cent. and the latter only 6.

It may be supposed by some that the great alteration in the rate of mortality of children in the metropolis between 10 and 15 years of age, arises from the circumstance that at this period of life many leave London for schools in the provinces, and, consequently, their deaths would not appear in the London returns of the Registrar-General. It must be borne in mind, however, that the census was taken prior to the period at which school-vacations usually occur, hence the returns would include such children only as were at that period, and are generally, residents of London.

After the age of 25 the mortality in the metropolis again increases until the period from 55 to 65, when it is 45 per cent. more than for England and Wales; subsequently to this it declines till the interval between 85 and 95, when it is 9 per cent. greater; from 95 to the remainder of life it shows the same features as from 10 to 25, only the case is reversed, the mortality for males and females being 6, and for males minus 13 per cent. Between 25 and 45, the period of child-bearing, the deaths among both sexes, conjointly, is less than among males only, and this is accounted for in the following manner by the Registrar-General.

"The chance of living from 25 to 45 is rather in favour of English women. The violent deaths of men on the rivers and the sea-coasts, in mines, in the streets, in travelling, in their dangerous occupations, the mental agitations and anxieties, terminating, unhappily, sometimes in suicide—the accumulation of workmen in ill-ventilated shops, or the hard exhausting work of the agricultural labourer, independently of war and service in unhealthy climates, counterbalance the dangers and sorrows of child-bearing."

It might be, perhaps, as well here to state, that in comparing the mortality of London with England and Wales generally, the deaths in the latter include the heavy fatality experienced by all its cities and towns, together with the metropolis. Consequently these results do not show the comparative value of life for London and the country.

<div align="center">*   *   *   *   *</div>

In the present essay I have endeavoured to show the difference in mortality between the metropolis and England and Wales. In another I propose to point out the diseases principally concerned in producing this effect, and likewise the tendency of civilization to promote their increase.

On the Statistics of Places of Worship in England and Wales, founded on a Table compiled by the Rev. T. Blisse. By REV. E. WYATT-EDGELL.

[Read before the Statistical Society of London, 15th December, 1851.]

THE object of this article is to show, first, the number of churches or chapels belonging to each denomination of Christians in England and Wales at the present time; and, secondly, how, in each denomination, they have increased during the last quarter of a century. The authorities from which it is compiled are the various Yearbooks, Manuals, Almanacs, and Magazines, of the different denominations of Protestants, the Roman Catholic Directory, and the evidence given by E. Baines, Esq., before the Church-rate Committee of the House of Commons in 1851.

I. It is computed that there are, in England and Wales, 28,290 churches and chapels, distributed amongst the various sects as follows:—

Denominations.	Churches or Chapels.	Per Cent.
1. The Established Church, which has....	14,000	49·49
2. The Presbyterians	150	·56
3. The Independents	2,572	9·09
4. The Baptists	1,943	6·87
5. The Wesleyan Connexion.....................	4,450	15·73
6. The Wesleyan New Connexion............	281	·99
7. The Primitive Methodists...................	1,662	5·87
8. The Wesleyan Methodist Association	322	1·10
9. Bible Christians...................................	415	1·47
10. The Calvinistic Methodists	778	2·76
11. Lady Huntingdon's Connexion	30	·11
12. The Unitarians	260	·91
13. The Quakers	330	1·17
14. Various minor Protestant sects............	500	1·77
15. Roman Catholics	597	2·11
	28,290	100·00